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(12) UK Patent Application (19) GB (11) 2 348 330 (13) A

(43) Date of A Publication 27.09.2000

(21) Application No 0007250.4

(22) Date of Filing 24.03.2000

(30) Priority Data
(31) 99010551 (32) 26.03.1999 (33) KR

(51) INT CL[7]
H04N 5/445

(52) UK CL (Edition R)
H3Q QLCA Q103 Q6R4

(56) Documents Cited
GB 2323489 A GB 2264409 A GB 2245786 A
WO 99/04559 A1 WO 93/12611 A1

(58) Field of Search
UK CL (Edition R) H3Q QDRP QLCA QLCX QLX
INT CL[7] H03J 1/02 , H04N 5/44 5/445 5/50 7/088
ONLINE: WPI, EPODOC, PAJ

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(54) Abstract Title
Apparatus and method for auto channel searching in a TV wherein various channel attributes are displayed in pages of channel listings

(57) Apparatus for auto channel searching in a TV comprising a tuner 1,2, video signal processor 3, program information memory 6 (e.g. EEPROM), micro-computer 10 and a logo memory 7 wherein channel list information along with a logo are read from the appropriate memories and displayed on screen (figure 5B). Also disclosed are auto channel search methods: A first embodiment including the steps of displaying a numerical list of channels and searching these channels in sequence; then indicating, preferably by use of different colours, which channel numbers do not have a broadcast signal and preferably indicating those channels having some other attribute (e.g. digital, analogue, specific company). Furthermore if a specific company is to be indicated in association with a channel preferably this is by use of a logo (figure 4B, S26) which is preferably captured from the transmission of the specific company and preferably displayed alongside a channel number when the TV is operated. A second embodiment includes the step of displaying a video image of a channel in which a search is being performed (figure 4A, S16). A third embodiment includes the step of displaying a users last selected channel from a previously displayed list of channels.

FIG. 3

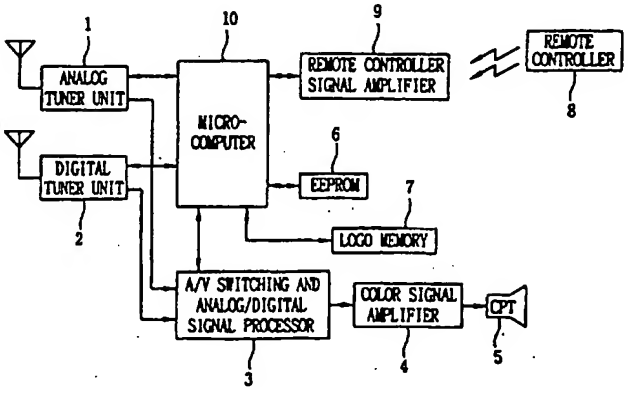

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FIG. 1
CONVENTIONAL ART

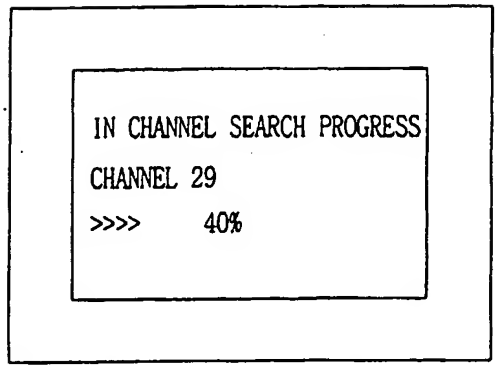


FIG. 2

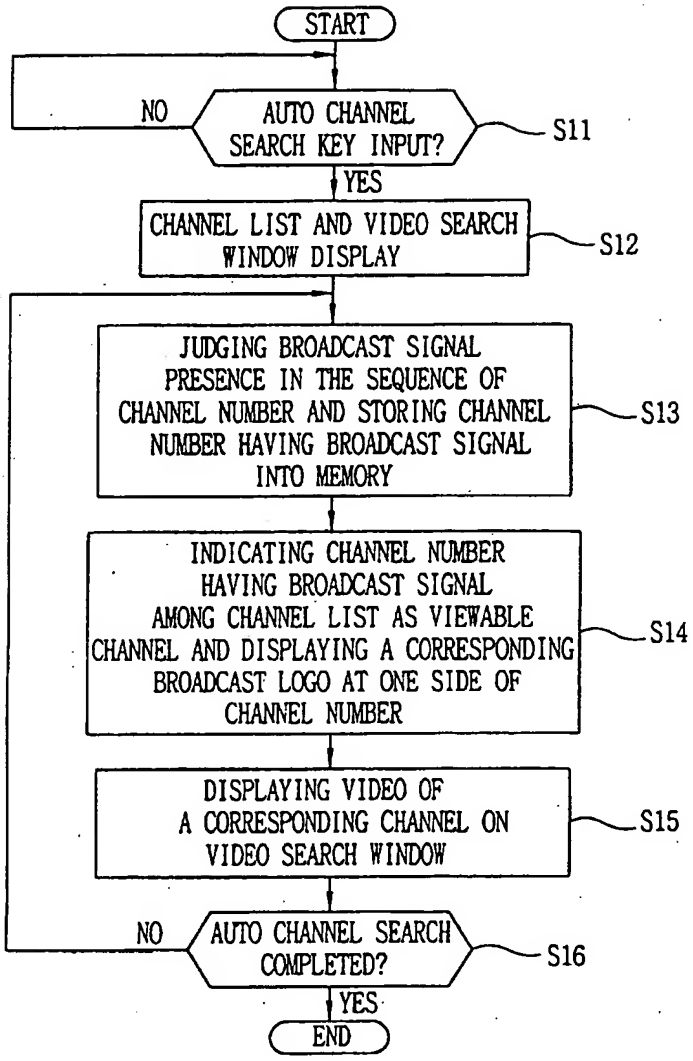

START
NO
AUTO CHANNEL SEARCH KEY INPUT?
S11
YES
CHANNEL LIST AND VIDEO SEARCH WINDOW DISPLAY
S12
JUDGING BROADCAST SIGNAL PRESENCE IN THE SEQUENCE OF CHANNEL NUMBER AND STORING CHANNEL NUMBER HAVING BROADCAST SIGNAL INTO MEMORY
S13
INDICATING CHANNEL NUMBER HAVING BROADCAST SIGNAL AMONG CHANNEL LIST AS VIEWABLE CHANNEL AND DISPLAYING A CORRESPONDING BROADCAST LOGO AT ONE SIDE OF CHANNEL NUMBER
S14
DISPLAYING VIDEO OF A CORRESPONDING CHANNEL ON VIDEO SEARCH WINDOW
S15
NO
AUTO CHANNEL SEARCH COMPLETED?
S16
YES
END

FIG. 3

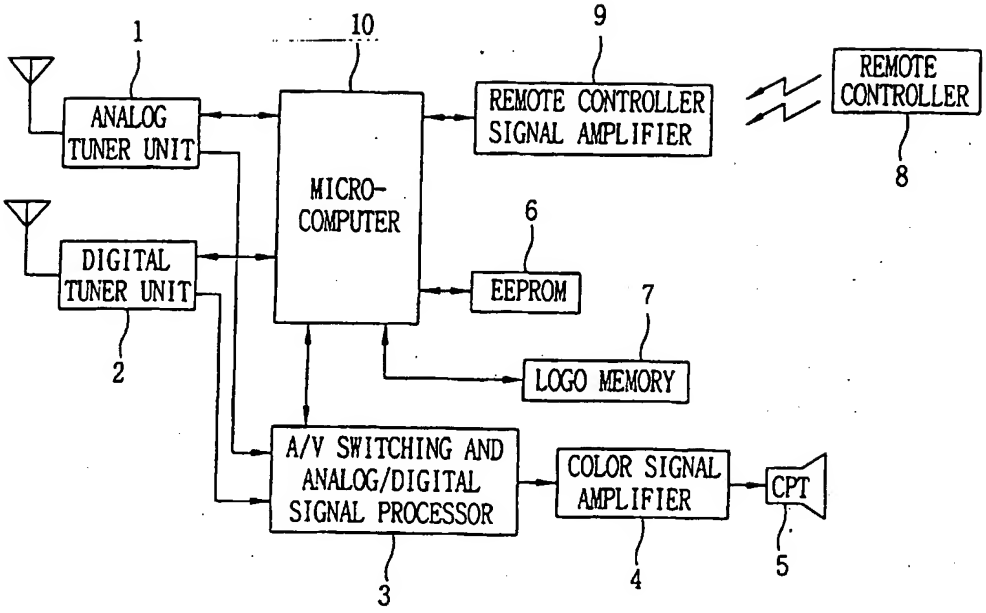

1
10
9
ANALOG TUNER UNIT
MICRO-COMPUTER
REMOTE CONTROLLER SIGNAL AMPLIFIER
REMOTE CONTROLLER
8
6
DIGITAL TUNER UNIT
EEPROM
7
2
LOGO MEMORY
A/V SWITCHING AND ANALOG/DIGITAL SIGNAL PROCESSOR
COLOR SIGNAL AMPLIFIER
CPT
3
4
5

FIG. 4A

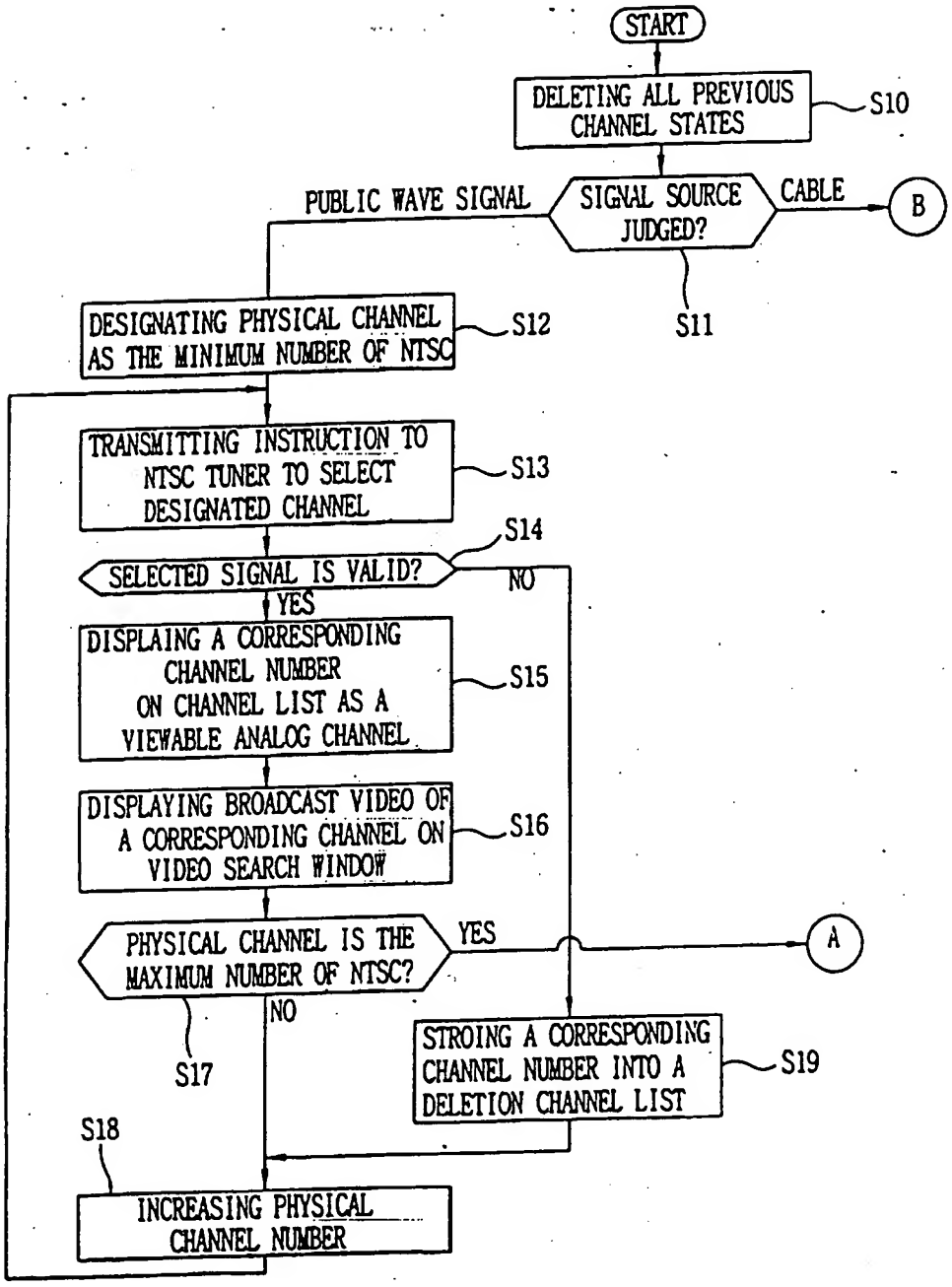

START
DELETING ALL PREVIOUS CHANNEL STATES
S10
SIGNAL SOURCE JUDGED?
PUBLIC WAVE SIGNAL
CABLE
B
S11
DESIGNATING PHYSICAL CHANNEL AS THE MINIMUM NUMBER OF NTSC
S12
TRANSMITTING INSTRUCTION TO NTSC TUNER TO SELECT DESIGNATED CHANNEL
S13
S14
SELECTED SIGNAL IS VALID?
NO
YES
DISPLAING A CORRESPONDING CHANNEL NUMBER ON CHANNEL LIST AS A VIEWABLE ANALOG CHANNEL
S15
DISPLAYING BROADCAST VIDEO OF A CORRESPONDING CHANNEL ON VIDEO SEARCH WINDOW
S16
PHYSICAL CHANNEL IS THE MAXIMUM NUMBER OF NTSC?
YES
A
NO
S17
STROING A CORRESPONDING CHANNEL NUMBER INTO A DELETION CHANNEL LIST
S19
S18
INCREASING PHYSICAL CHANNEL NUMBER

FIG. 4B

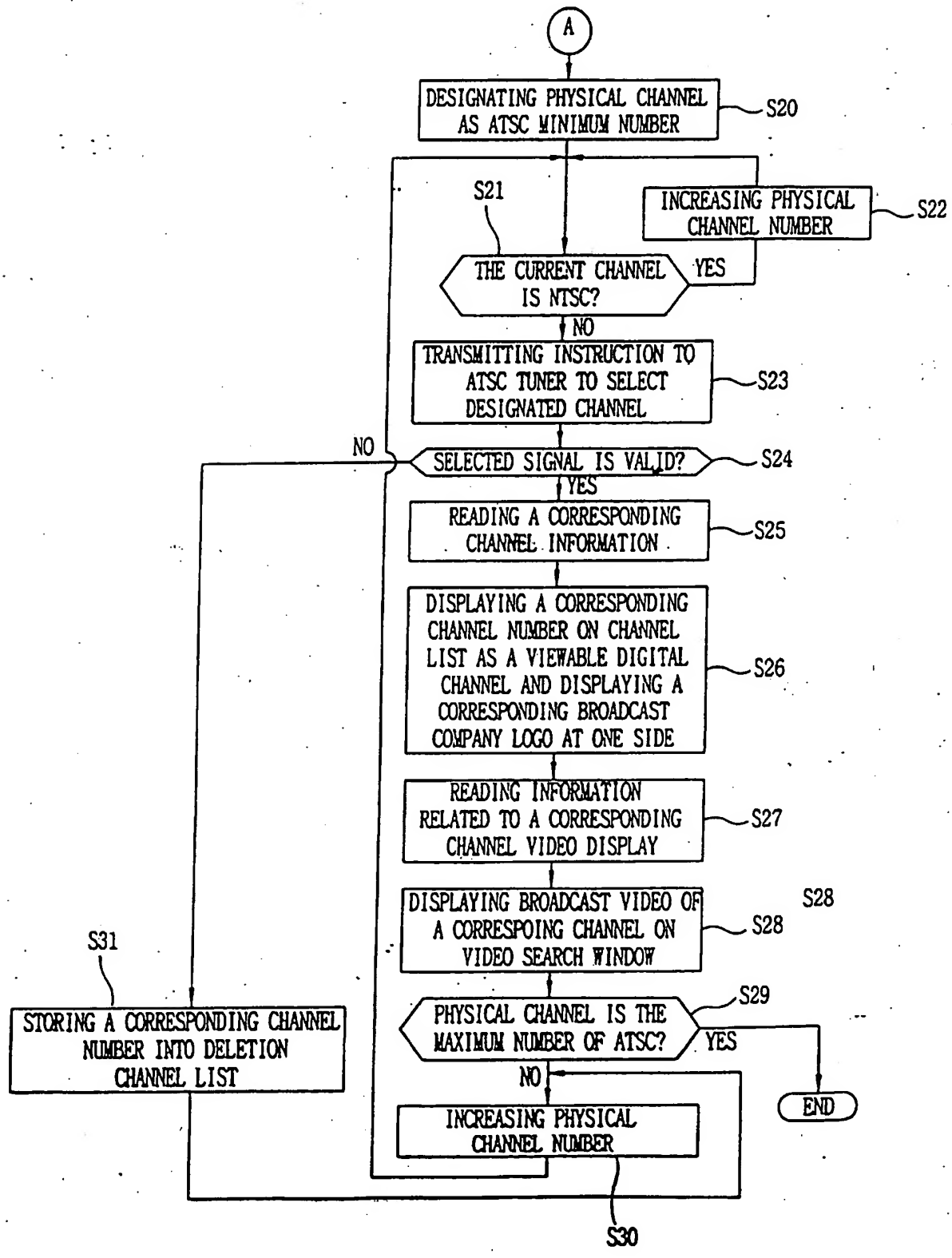

A
DESIGNATING PHYSICAL CHANNEL AS ATSC MINIMUM NUMBER
S20
S21
INCREASING PHYSICAL CHANNEL NUMBER
S22
THE CURRENT CHANNEL IS NTSC?
YES
NO
TRANSMITTING INSTRUCTION TO ATSC TUNER TO SELECT DESIGNATED CHANNEL
S23
NO
SELECTED SIGNAL IS VALID?
S24
YES
READING A CORRESPONDING CHANNEL INFORMATION
S25
DISPLAYING A CORRESPONDING CHANNEL NUMBER ON CHANNEL LIST AS A VIEWABLE DIGITAL CHANNEL AND DISPLAYING A CORRESPONDING BROADCAST COMPANY LOGO AT ONE SIDE
S26
READING INFORMATION RELATED TO A CORRESPONDING CHANNEL VIDEO DISPLAY
S27
DISPLAYING BROADCAST VIDEO OF A CORRESPOING CHANNEL ON VIDEO SEARCH WINDOW
S28
S28
S31
STORING A CORRESPONDING CHANNEL NUMBER INTO DELETION CHANNEL LIST
PHYSICAL CHANNEL IS THE MAXIMUM NUMBER OF ATSC?
S29
YES
NO
END
INCREASING PHYSICAL CHANNEL NUMBER
S30

FIG. 4C

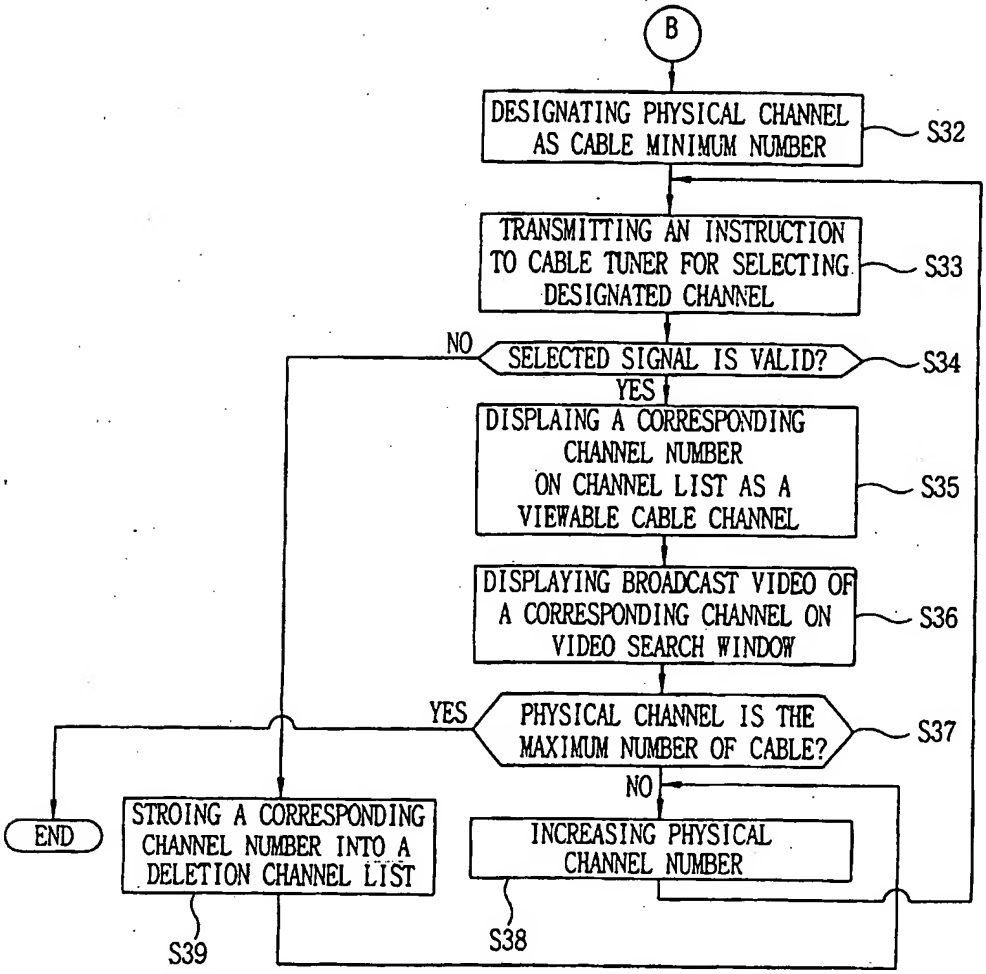

B
DESIGNATING PHYSICAL CHANNEL AS CABLE MINIMUM NUMBER
S32
TRANSMITTING AN INSTRUCTION TO CABLE TUNER FOR SELECTING DESIGNATED CHANNEL
S33
NO
SELECTED SIGNAL IS VALID?
S34
YES
DISPLAING A CORRESPONDING CHANNEL NUMBER ON CHANNEL LIST AS A VIEWABLE CABLE CHANNEL
S35
DISPLAYING BROADCAST VIDEO OF A CORRESPONDING CHANNEL ON VIDEO SEARCH WINDOW
S36
YES
PHYSICAL CHANNEL IS THE MAXIMUM NUMBER OF CABLE?
S37
NO
END
STROING A CORRESPONDING CHANNEL NUMBER INTO A DELETION CHANNEL LIST
S39
INCREASING PHYSICAL CHANNEL NUMBER
S38

FIG. 5A

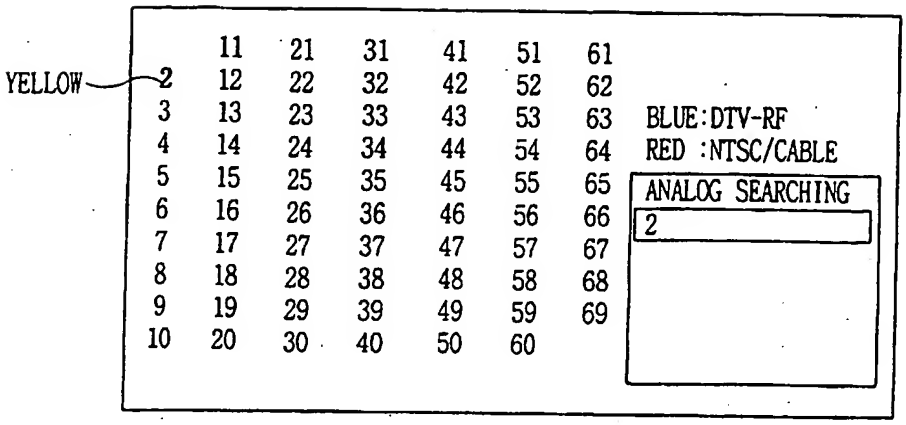
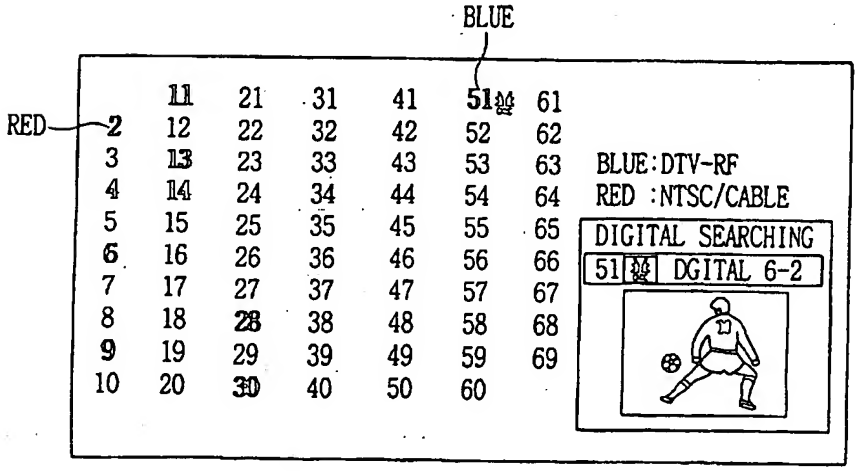

YELLOW
11 21 31 41 51 61
2 12 22 32 42 52 62
3 13 23 33 43 53 63
4 14 24 34 44 54 64
5 15 25 35 45 55 65
6 16 26 36 46 56 66
7 17 27 37 47 57 67
8 18 28 38 48 58 68
9 19 29 39 49 59 69
10 20 30 40 50 60
BLUE:DTV-RF
RED :NTSC/CABLE
ANALOG SEARCHING
2

FIG. 5B


BLUE
RED
11 21 31 41 51 61
2 12 22 32 42 52 62
3 13 23 33 43 53 63
4 14 24 34 44 54 64
5 15 25 35 45 55 65
6 16 26 36 46 56 66
7 17 27 37 47 57 67
8 18 28 38 48 58 68
9 19 29 39 49 59 69
10 20 30 40 50 60
BLUE:DTV-RF
RED :NTSC/CABLE
DIGITAL SEARCHING
51 DGITAL 6-2

APPARATUS AND METHOD FOR AUTO CHANNEL SEARCHING OF VIDEO DISPLAY APPARATUS

The present invention relates to a video display apparatus, and in particular to an apparatus and method for an auto channel searching of a video display apparatus.

Generally, an auto channel searching function is capable of judging a broadcast channel of a selected channel exists, memorizing the channel having a broadcast signal as a valid channel and being used when selecting a certain channel and is generally used when first purchasing a TV or reinstalling the TV.

For example, in the case of searching an auto channel with respect to an analog broadcast, public wave channels 2 through 69 and cable channels 1 through 125 are searched in the sequence of a channel number for thereby detecting a channel having a corresponding signal, and the detected channel is stored into a memory. In this state, when a user pushes a channel up/down key, the channel is changed to the channel sequence stored in the memory.

In the auto channel search method of the conventional TV, the presence of the broadcast signal are searched in the sequence of the channel number with respect to the whole channels, and then the channel having a broadcast signal is memorized for thereby implementing an auto channel search. As shown in Figure

1, the proceeding degree of the auto channel search is displayed by the unit of % together with the currently searching channel number.

In the auto channel search method of the conventional TV, the proceeding degree is simply displayed. Namely, the existing channel types and corresponding broadcast service company name are not displayed, so that a user can not easily recognize a certain broadcast company name and whether a certain channel is available.

Accordingly, it is an aim of embodiments of the present invention to provide an auto channel searching apparatus for a TV and a method thereof which are capable of overcoming the problems encountered in the conventional art and easily recognizing a certain broadcast channel of a user.

According to one aspect, there is provided an auto channel searching apparatus for a TV according to the present invention which includes a tuner unit for selecting an analog, digital or cable broadcast signal, a signal processing unit for performing a switching operation of an audio and video signal among the broadcast signals selected by the tuner unit and performing a video process of the broadcast signal, a CPT for reproducing a video signal outputted from the switching and signal process unit on a screen, an EEPROM for storing various program information and channel list-related information, a logo memory for storing a broadcast company-based logo video, a key input unit for inputting various operation keys, and a microcomputer for controlling each unit of a TV system so that a channel list information and each broadcast company-based logo

information is read in accordance with an auto channel search instruction inputted by the key input unit from the EEPROM and the logo memory and displaying on a screen based on a video process.

According to another aspect, there is provided an auto channel searching method for a TV which includes a step for displaying a channel list in accordance with a channel search instruction of a user and performing a search in the sequence of the number stored in the channel list, and a step for performing an indication operation for separating a channel number which does not have a broadcast signal with respect to a channel number which has a broadcast signal in the channel list.

Embodiments of the present invention will become better understood with reference to the accompanying drawings which are given only by way of illustration and thus are not limitative of the present invention, wherein:

Figure 1 is a view illustrating an auto channel search screen of a conventional TV;

Figure 2 is a flow chart for describing an auto channel search method of a embodying the present invention;

Figure 3 is a block diagram of an auto channel search apparatus for a TV embodying the present invention;

Figures 4A through 4C are a flow chart of an auto channel search method embodying the present invention; and

Figures 5A and 5B are views illustrating an embodiment of an auto

channel search screen for a TV embodying the present invention.

The auto channel search apparatus for a TV embodying the present invention includes a tuner unit for selecting an analog, digital or cable broadcast signal, a switching and signal processing unit for performing a switching operation of an audio signal and a video signal among the broadcast signals selected by the tuner unit and performing a video process of the broadcast signal, a CPT for displaying a video signal from the switching and signal processing unit on a screen, an EEPROM for storing various program information and a channel list-related information, a logo memory for storing a logo image by the broadcast service company, a key input unit for inputting various operation instructions, and a microcomputer for controlling each unit of the system so that a channel list information and each broadcast-based logo information are read in accordance with an auto channel search memory inputted through the key input unit from the EEPROM and logo memory and displayed on the screen based on a video process.

The auto channel search method for a TV embodying the present invention includes a step for displaying a channel list in accordance with an auto channel search instruction of a user and searching the channel list in the sequence of the channel number stored in the channel list, and a step for performing a display operation for separating a channel number which does not have a broadcast signal with respect to the channel number which has the broadcast signal in the channel list.

In addition, the auto channel search method for a TV embodying the present invention includes a step for displaying a channel list and channel search screen in which a certain signal is displayed in the channel having a broadcast signal by an auto channel search when a user inputs a channel selection key such as an up/down key, and a step for displaying the last selected channel of the user on the screen based on the channel list and search screen.

In the present invention, as shown in Figure 2, in Step S11, it is judged whether a user inputs an auto channel search key, and when the channel search key is inputted, a video search window is displayed for providing a user with a video of a channel for a channel list and search in Step S12.

In Step S13, it is judged whether a broadcast signal exists in a corresponding channel in the sequence of the channel numbers stored in the channel list, and the channel number having the broadcast signal is stored in the memory. In addition, the channel having the broadcast signal among the channel number in the channel list is indicated as a view available channel. Namely, in the case that the channel number is an analog channel, the channel is indicated by a red color, and in the case of the digital channel, the channel is indicated by a blue color, so that a user can easily recognize an available channel, namely, a view available channel having a broadcast signal, and the logo of a corresponding broadcast company is displayed at one side of the digital channel number in Step S14.

At this time, before the search is performed, the channel number stored in the channel list is indicated by a black color. When the search is performed, a corresponding channel number is indicated by a yellow color. In this state, the channel number having a broadcast signal is indicated by a red color, and the

digital is indicated by a blue color. In addition, the logo of a corresponding broadcasting company is displayed at one side of the channel number having a broadcast signal, so that a user can easily recognize whether the currently proceeding channel is an analog broadcast or a digital broadcast, and it is possible to easily recognize the name of the broadcasting company.

In addition, in a method, the logo of the broadcast company may be transmitted from the broadcast company together with the broadcast signal, and then the video data is processed for implementing the logo, and the logo is displayed at one side of the channel number. In another method, the logo of a corresponding broadcast company may be stored in an image file format and is matched with a corresponding channel for thereby displaying the logo.

In particular, in the case of the digital channel, a certain video data is transmitted together with the broadcast signal for implementing the logo of the broadcast comp[any based on an easier transmission of various information including the broadcast signal.

In addition, in the case of the analog channel, a corresponding channel-based broadcast company name or logo is transmitted from the broadcast company together with a broadcast signal. The channel-based broadcast company name or logo is stored into the memory in the TV system and is matched with a corresponding channel for thereby displaying the logo, so that it is possible to implement the same operation as the digital channel.

The video of the channel of the current search is displayed on the video search window in Step S15.

The channel search is performed with respect to the entire channels, namely, the analog channel and digital channel for thereby completing the auto

channel search in Step S16.

The auto channel search apparatus for a TV and a method thereof embodying the present invention will be explained with reference to the accompanying drawings.

Figure 3 is a block diagram of an auto channel search apparatus for a TV embodying the present invention, Figures 4A through 4C are a flow chart of an auto channel search method for a TV embodying the present invention, and Figures 5A and 5B are views illustrating an embodiment of an auto channel search screen for a TV embodying the present invention.

As shown in Figure 3, the auto channel search apparatus for a TV embodying the present invention includes an analog tuner 1 for selecting an analog broadcast signal, a digital tuner 2 for selecting a digital broadcast signal, an A/V switching and analog/digital signal processing unit 3 for performing a switching operation of an audio signal and a video signal among the broadcast signals selected by the analog tuner 1 and the digital tuner 2 and a video process of the analog/digital broadcast signal, a color signal amplifying unit 4 for amplifying the color signal outputted from the A/V switching and analog/digital signal processing unit 3, a CPT 5 for reproducing a video, an EEPROM 6 for storing various program information and channel list-related information, a logo memory 7 for storing the logo images of the broadcast companies, a remote controller 8 for inputting various operation instructions, a remote controller signal amplifier 9 for amplifying a remote controller signal, and a microcomputer 10 for controlling each unit of the TV system so that a channel list information and each broadcast company-based logo information are read from the EEPROM 6 and the logo memory 7 in accordance with an auto channel search instruction inputted by the

remote controller 8.

An embodiment of the auto channel search method based on an auto channel search apparatus for a TV embodying the present invention will be explained.

As shown in Figures 4A-4C, the auto channel search method for a TV embodying the present invention will be explained. When a user inputs an auto channel search key using the remote controller 8, the microcomputer 10 recognizes the inputted key. As shown in Figure 5A, a channel list and a video search window are displayed at one side for a video search of a corresponding channel, and the current channel state is deleted in Step S10, and a signal input source, namely, a public wave signal or a cable signal is judged in Step S11.

As a result of the judgement of Step S11, the broadcast signal is a public wave signal, the search is performed with respect to the whole channels of the analog and digital signals. First, the search is performed with respect to the analog channel(NTSC), and a physical channel number is designated as a minimum number of the analog channel in Step S12.

A channel selection instruction is transmitted to the analog tuner 1 so that the designated channel is selected in Step S13. Thereafter, it is judged whether the broadcast signal of the selected channel is available, namely, whether the signal can be viewed in Step S14. If available, a corresponding channel number is changed to the red color, so that the corresponding channel number is indicated as a viewable analog channel in Step S15.

As a result of the judgement S14, if the corresponding channel is not available, namely, there is not a broadcast signal, a corresponding channel number is stored in the deletion channel list of the EEPROM 6 in Step S19. In

addition, a broadcast video of a corresponding channel is displayed on the video search window at one side of the channel list in Step S16. Thereafter, the physical channel is judged to be the maximum number of the analog channel in Step S17. If not the maximum number, the channel number is increased in Step S18, and a corresponding channel is selected by the analog tuner 1.

In addition, as a result of the judgement of Step S17, if the physical channel is the maximum number of the analog channel, it means that the search with respect to the analog channel is completed. Therefore, the current physical channel is designated as the minimum number of the digital channel(ATSC) for performing a search with respect to the digital channel in Step S20.

The broadcast channel system will be explained. Since the analog and digital signals are not divided into a certain sections but are mixed each other, so that when increasing the channel number for the digital channel search, the analog channel is searched, so that the total search time is increased. Therefore, in order to prevent the above-described problems, it is judged whether the current channel is the analog channel in Step S21. As a result of the judgement, if the current channel is the analog channel, the availability of the selected signal is not checked, and the channel number is increased in Step S22.

As a result of the judgement of Step S21, if the current channel is the digital channel, a channel selection instruction is transmitted to the digital tuner 2 to select the designated channel in Step S23. Thereafter, it is judged whether the broadcast signal of the selected channel is available in Step S24. If available, a corresponding channel-related information, namely, a corresponding channel broadcast company name, a broadcast company logo, etc. is read in Step S25. In addition, the broadcast company logo is stored in the logo memory 7. At this time,

the availability of a corresponding channel is judged in accordance with the presence state of the synchronous signal.

In addition, the corresponding channel number is changed to the blue color for thereby indicating as a viewable digital channel, and a corresponding broadcast company logo stored in the logo memory 7 is read in Step S25 and is video-processed and is displayed at one side of a corresponding channel number in Step S26. A display-related information, namely, a packet ID(PID) is read for displaying the video of a corresponding channel on the video search window in Step S27.

In addition, a transport packet is decoded using the packet ID, and a video information of a corresponding channel is video-processed and is displayed on the video search window in Step S28. Thereafter, it is judged whether the current physical channel number is the maximum number of the digital channel in Step S29. As a result of the judgement, if the current physical channel number is the maximum number, the routine is completed. If the current physical channel number is not the maximum number, the physical channel number is increased in Step S30. The Steps S21 through S29 are performed up to the maximum number. In addition, as a result of the judgement of Step S24, if a corresponding channel is not available, namely, if the broadcast signal is not present, a corresponding channel number is stored into the deletion channel list of the internal memory like the analog channel auto search in Step S31.

As a result of the signal input source judgement of Step S11, if the broadcast is the cable broadcast, the physical channel number is designated based on the minimum number of the cable channel in Step S32. In addition, a channel selection instruction is transmitted to the cable tuner(not shown) so that

the designated channel is selected in Step S33. Thereafter, it is judged whether the selected broadcast signal is valid in Step S34. If valid, a corresponding channel number is changed to the green color for thereby indicating a viewable cable channel in Step S35.

As a result of the judgement of Step S14, if the corresponding channel is invalid, namely, if the broadcast signal is not present, a corresponding channel number is stored into the deletion channel list of the internal memory like the auto search of the analog and digital channel in Step S39. In addition, the broadcast video of a corresponding channel is displayed on the video search window at one side of the channel list in Step S36. Thereafter, it is judged whether the physical channel is the maximum number of the cable channel in Step S37. If the physical channel is not the maximum number, the channel number is increased in Step S38. In addition, the steps S33 through S37 are performed up to the maximum number for thereby completing the search with respect to the cable channel.

In the auto channel search method of a TV embodying the present invention, the process that the channel search is performed is displayed based on the color change of the channel number, and the channel having the broadcast signal is separated from other channels using a color change and the logo of a corresponding broadcast company for thereby implementing an easier channel recognition of the user. The video of the channel in which the search is proceeded together with the channel list is displayed for thereby increasing the product satisfaction by increasing a visual desire of the user.

As the present invention may be embodied in several forms without departing from the essential characteristics thereof, it should also be understood that the above-described embodiment is not limited by any of the

details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its scope as defined in the appended claims, and therefore all changes and modifications that fall within the meets and bounds of the claims, or equivalences of such meets and bounds are therefore intended to be embraced by the appended claims.

What is claimed is:

1. In an auto channel search apparatus for a TV, an auto channel search apparatus for a TV, comprising:

a tuner unit for selecting an analog, digital or cable broadcast signal;

a signal processing unit for performing a switching operation of an audio and video signal among the broadcast signals selected by the tuner unit and performing a video process of the broadcast signal;

a CPT for reproducing a video signal outputted from the switching and signal process unit on a screen;

an EEPROM for storing various program information and channel list-related information;

a logo memory for storing a broadcast company-based logo video;

a key input unit for inputting various operation keys; and

a microcomputer for controlling each unit of a TV system so that a channel list information and each broadcast company-based logo information is read in accordance with an auto channel search instruction inputted by the key input unit from the EEPROM and the logo memory and displaying on a screen based on a video process.

2. In an auto channel search method for a TV, an auto channel search method for a TV, comprising:

a step for displaying a channel list in accordance with a channel search instruction of a user and performing a search in the sequence of the number stored in the channel list; and

a step for performing an indication operation for separating a channel number which does not have a broadcast signal with respect to a channel number which has a broadcast signal in the channel list.

3. In an auto channel search method for a TV, an auto channel search method for a TV, comprising:

a step for displaying a video of a channel in which a search is performed in a step for performing a search in the sequence of channels at one side of a channel list.

4. The method of claim 2, wherein in said indication operation step, a corresponding channel number is indicated by a certain color which is different from the color of a channel number which does not have a broadcast signal.

5. The method of claim 2, wherein in said indication operation step, a corresponding channel number is indicated by a different color in accordance with an analog/digital channel.

6. The method of claim 2, 4 or 5, wherein said indication operation step includes a step in which a logo of a corresponding broadcast company is displayed at one side of a channel in which an indication operation is being performed.

7. The method of claim 6, wherein in said step for displaying the logo of the broadcast company, a logo video data transmitted together with a broadcast

signal of a corresponding channel is video-processed for thereby displaying at one side of a corresponding channel number.

8. The method of claim 6, wherein in said step for displaying the logo of the broadcast company, a broadcast company-based logo video data stored in a memory of the TV is matched with a corresponding channel number for thereby displaying at one side of a corresponding channel number.

9. In an auto channel search method for a TV, an auto channel search method for a TV, comprising:

a step for displaying a channel list and channel search screen in which a certain indication is performed at a channel having a broadcast signal by an auto channel search when a user inputs a channel selection memu key after an auto channel search is completed in accordance with a channel search instruction of a user; and

a step for displaying a user's last selected channel on a previous screen based on the channel list and search screen.

10. An auto channel search apparatus substantially as hereinbefore described with reference to and/or as shown in Figures 2 to 5.

11. An auto channel search method substantially as hereinbefore described with reference to and/or as shown in Figures 2 to 5.

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Application No: GB 0007250.4 **Examiner:** Paul Jefferies
Claims searched: 1 **Date of search:** 21 July 2000

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): H3Q (QDRP, QLCA, QLCX, QLX)

Int Cl (Ed.7): H03J 1/02; H04N 5/44, 5/445, 5/50, 7/088

Other: ONLINE: WPI, EPODOC, PAJ

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB 2323489 A	(MICROSOFT) See figures 2, 3 and Abstract.	1, 10, 11
A	GB 2264409 A	(AMSTRAD) See whole document.	
A	GB 2245786 A	(THOMSON) See figure 1.	
X	WO 99/04559 A1	(SAMSUNG) See figures 1 and 6.	1, 10, 11
X	WO 93/12611 A1	(THOMSON) See figure 1, Abstract and claim 1.	1, 10, 11

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X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.